Damien **LaRocque**

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Overview

With a background in robotics and machine learning, I gained expertise in developing software solutions for autonomous mobile robots, through my work at the Northern Robotics Laboratory (Norlab) of *Université Laval* and my participation in the *Eurobot* competition with French and Canadian teams. My skills span over:

- **Field Robotics**
- **Terrain Characterization**
- **Robot Operating System (ROS)**
- **Computer Vision & Sensor Fusion**
- **Electronic Design**
- **Embedded Programming**

Education

Master of Science - Computer Science — **Université Laval**, *Quebec City, QC, Canada* — *2020-2024*
Cumulative GPA: *4.26/4.33*
Thesis title: "*Terrain Analysis using Data from Proprioceptive Sensors on Mobile Robots*"

Bachelor of Engineering - Electrical Engineering — **Université de Moncton**, *Moncton, NB, Canada* — *2015-2020*
Cumulative GPA: *4.22/4.30* (Recipient of the Best Academic Achievement Award in the Faculty of Engineering's Graduating Class)

Work Experience

Robotics Engineer — *2025-*
Sereact GmbH, *Stuttgart, Germany*

Research Assistant in Field Robotics — *2020-2024*
Northern Robotics Laboratory (Norlab), Université Laval, *Quebec City, QC, Canada*

- Conducted research on terrain characterization and power consumption of rovers in winter conditions using deep learning models, such as convolutional neural networks (CNNs) and Mamba.
- Executed field deployments with rovers in boreal forests under adversarial winter conditions.
- Integrated Robot Operating System (ROS) and ROS 2, configured and troubleshot DDS, and tested Zenoh on mobile robots.
- Authored and presented a peer-reviewed paper at IROS 2024, one of the top conferences in robotics and AI.
- Co-authored 3 papers, contributing to experiments and scientific writing.

Research Assistant in Robotics — *Summer 2019*
Université Laval, *Quebec City, QC, Canada*

Developed a MATLAB interface for simulating serial robotic arms in inverse kinematics problems. This interface is used to teach inverse kinematics algorithms to mechanical engineering students at Université Laval.

Research Assistant in Deep Learning and Artificial Intelligence (AI) — *2017-2018*
Université de Moncton, *Moncton, NB, Canada*

Developed object detection solutions with deep learning methods (Detectron, R-CNN) to identify objects on a conveyor and send the detections to a KUKA industrial robotic arm. Used TensorFlow and Keras, wrote documentation.

Research Assistant in Home Automation (IoT) — *2016-2017*
Université de Moncton, *Moncton, NB, Canada*

- Developed a communication interface between a smart air exchanger and a database for IoT applications.
- Measured the signal emitted by an ESP8266 WiFi microcontroller.

Publications

[1] K. Nasiri, W. Guimont-Martin, **D. LaRocque**, G. Jeanson, H. Bellemare-Vallières, V. Grondin, P. Bournival, J. Lessard, G. Drolet, J.-D. Sylvain, and P. Giguère, "Using Citizen Science Data as Pre-Training for Semantic Segmentation of High-Resolution UAV Images for Natural Forests Post-Disturbance Assessment", *Forests*, vol. 16, no. 4, p. 616, Mar. 2025.

[2] **D. LaRocque**, W. Guimont-Martin, D.-A. Duclos, P. Giguère, and F. Pomerleau, "Proprioception Is All You Need: Terrain Classification for Boreal Forests", in *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, Oct. 2024, pp. 11686–11693.

[3] M. Vaidis, W. Dubois, E. Daum, **D. LaRocque**, and F. Pomerleau, "Uncertainty Analysis for Accurate Ground Truth Trajectories with Robotic Total Stations", in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, Oct. 2023, pp. 5312–5319.

[4] D. Baril, S.-P. Deschênes, O. Gamache, M. Vaidis, **D. LaRocque**, J. Laconte, V. Kubelka, P. Giguère, and F. Pomerleau, "Kilometer-scale autonomous navigation in subarctic forests: Challenges and lessons learned", *Field Robotics*, vol. 2, no. 1, pp. 1628–1660, Mar. 2022.

Skills

Programming

Programming Languages	Python (Expert), C++, LaTeX, JavaScript (Bases), Rust (Bases)
Libraries/Frameworks	ROS, ROS 2, OpenCV, Flask, Python scientific programming, Python packaging
Machine Learning	Numpy, Pandas, Scikit-Learn, PyTorch
DevOps	Git (Advanced), Docker, Podman, GitLab CI, `pyenv`, `tmux`, `vcstool`, Linux (Ubuntu, Debian)
Embedded Programming	Raspberry Pi, PlatformIO, ESP32, ESP8266, Arduino, Jetson

Others

Engineering	KiCad, LTSpice, NI Multisim, FreeCAD, Ondsel ES, PCB design, 3D printing
Languages	French (Mother tongue), English (Bilingual - IELTS Academic 8.0), German (Conversational),

Projects

Open source projects

rosbag-tools *2023-*

A ROS-agnostic toolbox for common rosbag operations,

Developer and maintainer of a Python package to rapidly process *ROSBag* datasets. *ROSBag* is the standard format to record robot data in ROS.

tcr-roboclaw *2022-*

An easy to install version of Basicmicro's RoboClaw Python library,

Developer and maintainer of `tcr-roboclaw`, a Python package to control BasicMicro's *RoboClaw* motor drivers.

Student clubs

Team Chat Robotique *2021-*

Team participating in the French Robotics Cup, *Le Creusot, France*

Team Chat Robotique is a team participating in the French Robotics Cup, the largest student robotics competition in Europe. The team's robots autonomously perform agility tasks in a given time. They are designed remotely, since all the members are spread across France and the world.

- **Electronic lead**: Robot electrical architecture design, PCB design with KiCad, Soldering
- **Programming**: Robot interfacing and drivers, Computer Vision: Pose estimation with ArUco markers, Website maintenance

CubeSat NB *2018-2019*

Team of the Canadian CubeSat Project, *Moncton, NB, Canada*

- Participated in the kickoff meeting of the CubeSat NB project and early planning discussions. (Press Release)
- Conducted in-depth research on CubeSat components and their standards, including the PC/104 standard.
- Explored the use of KubOS for programming the On Board Computer (OBC) and developed proofs of concept to determine its viability.
- Compiled and contributed to a comprehensive report detailing key technical and regulatory aspects of CubeSat development.

Groupe de Robotique de l'Université de Moncton (GRUM) *2017-2020*

Team participating in the Eurobot robotics competition, *Moncton, NB, Canada*

GRUM is a team participating in the *Eurobot* competition, the European final of the French Robotics Cup, with up to 300 participating teams coming from up to 40 countries around the world. The team's robots are autonomous and are designed to perform agility tasks in a given time.

- **Computer Vision**: Image processing to detect objects in images acquired by our robots, Hockey puck detection using image processing, Color sequence identification
- **Project management**: Organization of meetings and programming classes for the members of the club, Search for sponsors
- **Awards**: *Eurobot* 2019 Team Spirit Award, 2019 Student Delegation of the Year Award of Université de Moncton.

Awards

2021-2022 **FRQNT scholarship for Francophone Canadians**, Fonds de recherche du Québec - Nature et technologies

2020-2021 **Canada Graduate Scholarship - Master**, Natural Sciences and Engineering Research Council

2020 **Best academic performance of the class**, Faculty of Engineering, Université de Moncton

2018 **Duc T. Phi Award for academic excellence in Electrical Engineering degree lectures**, Faculty of Engineering, Université de Moncton

2017 **Undergraduate Student Research Award**, Natural Sciences and Engineering Research Council

2015 **21,000 $ of scholarships**, Université de Moncton